March 17, 1942. C. H. WOLF ET AL 2,276,555

ELECTRIC SWITCH

Filed May 1, 1940 3 Sheets-Sheet 1

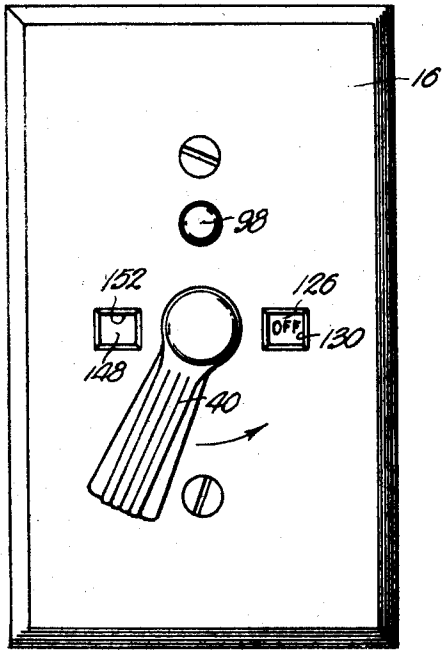


Fig. 1.

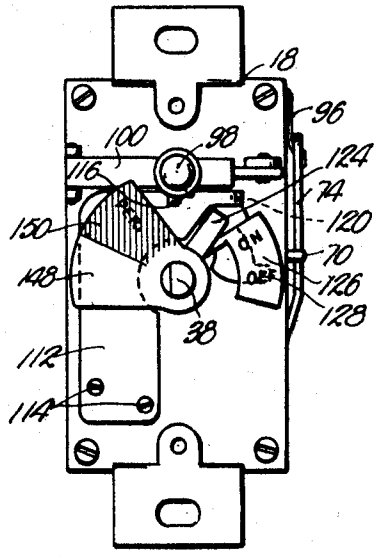


Fig. 2.

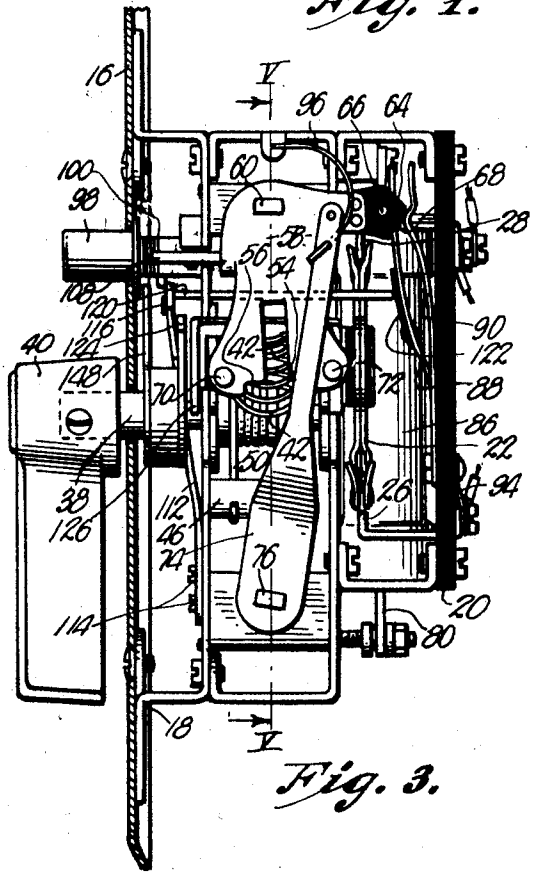


Fig. 3.

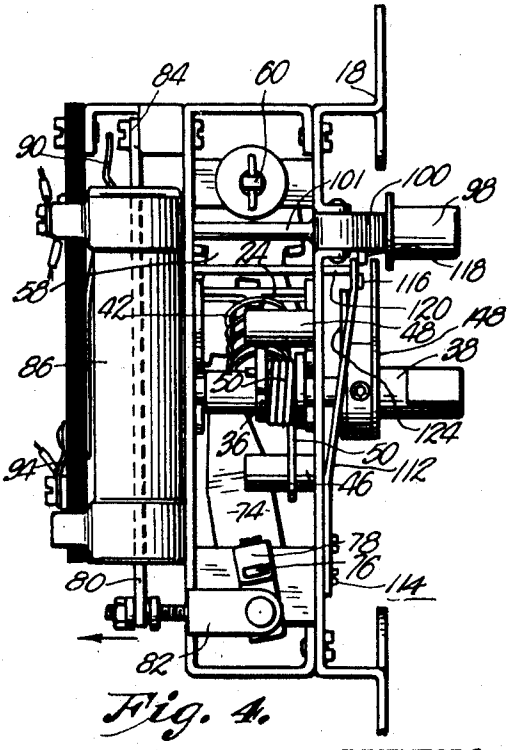


Fig. 4.

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March 17, 1942. C. H. WOLF ET AL 2,276,555

ELECTRIC SWITCH

Filed May 1, 1940 3 Sheets-Sheet 2

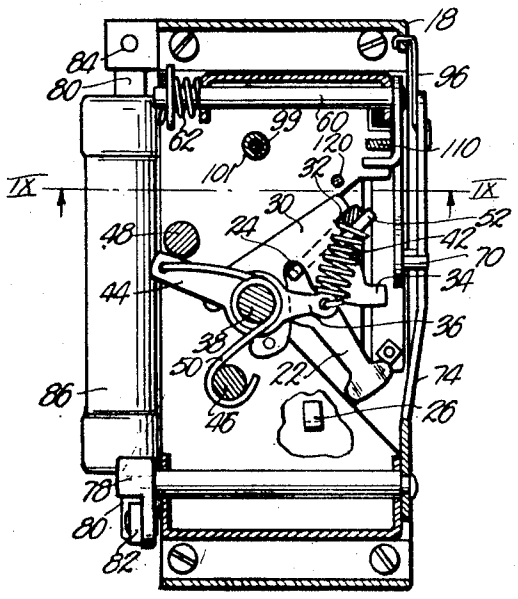


Fig. 5.

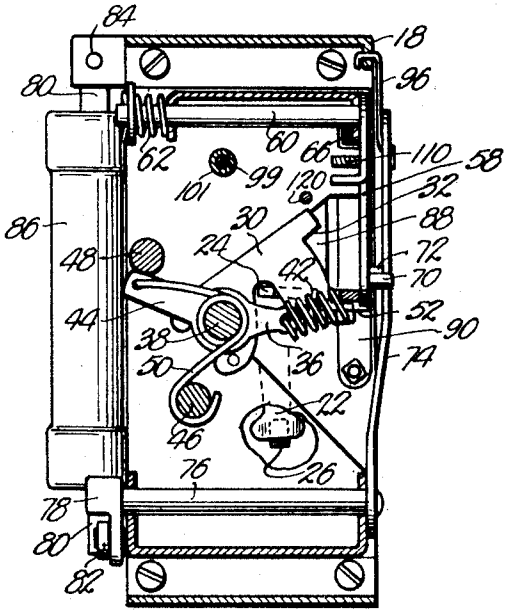


Fig. 6.

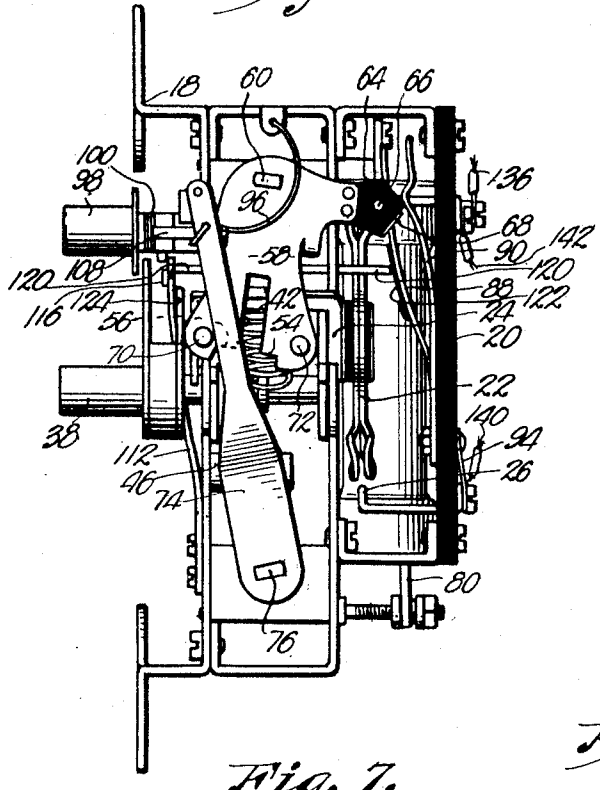


Fig. 7.

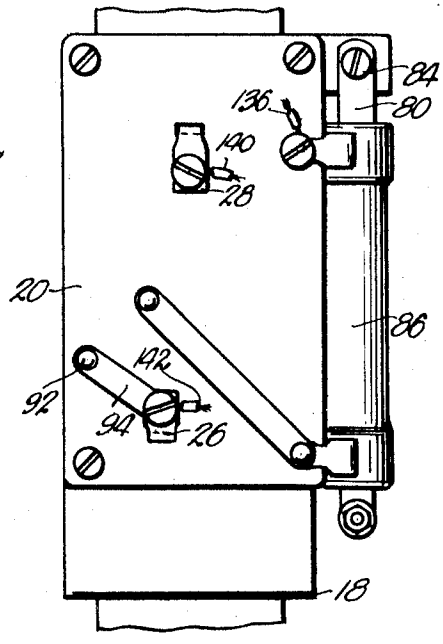


Fig. 8.

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ELECTRIC SWITCH

Filed May 1, 1940 3 Sheets-Sheet 3

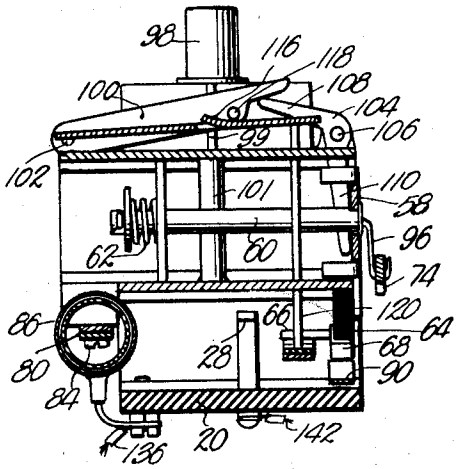


Fig. 9.

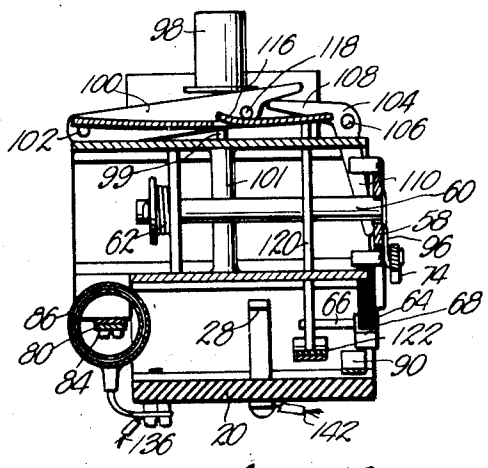


Fig. 10.

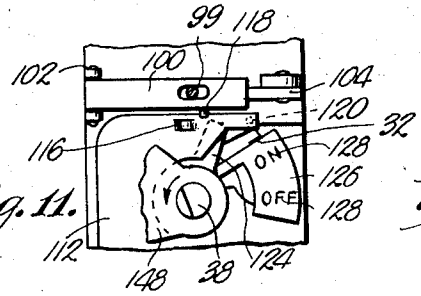


Fig. 11.

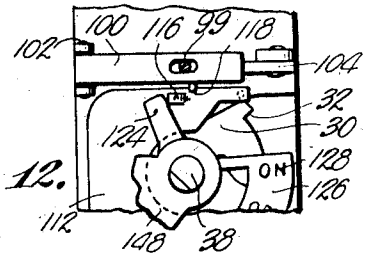


Fig. 12.

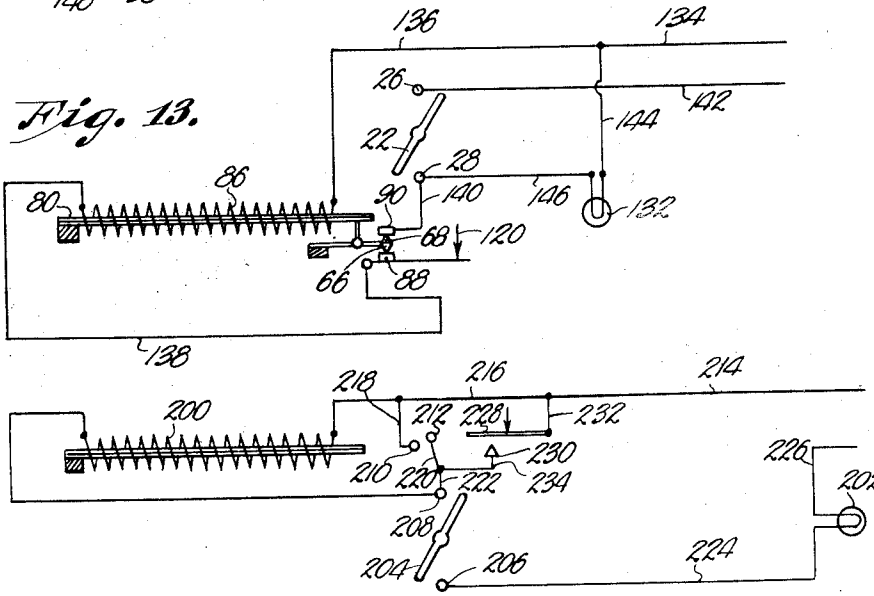


Fig. 13.

Fig. 14.

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Patented Mar. 17, 1942 2,276,555

UNITED STATES PATENT OFFICE

2,276,555

ELECTRIC SWITCH

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Application May 1, 1940, Serial No. 332,738

16 Claims. (Cl. 200—122)

This invention relates to electric switches of the type having both automatic and manually operable means for moving a main switch blade to the open-circuit position after the said blade has been disposed in the closed-circuit position by manually operable parts disposed within easy reach of an operator.

This invention has for another aim the provision of an electric switch wherein is included manually operable means for moving the switch blade to the closed-circuit position, thermally responsive structure for automatically releasing parts of the switch so as to return the switch blade to the open-circuit position, and means permitting the movement of the switch blade back to the closed-circuit position prior to the return of the thermally responsive structure to normal position.

A further object of the invention is to provide an electric switch of the foregoing character with a second manually operable means for causing the switch blade to move to the open-circuit position, which second manually operable means is effective to perform the aforesaid duty regardless of the condition or position of the thermally responsive structure.

An even further aim of the invention is to provide an electric switch with manually operable parts for moving the switch blade to the closed-circuit position and a second manually operable means for causing the switch blade to move to the open-circuit position, said two manually operable means being interconnectible for the purpose of rendering ineffective the thermally responsive structure of the switch, until the said second manually operable means has been actuated to break the connection between the two manually operable means and to cause the switch blade to assume the open-circuit position.

Another important object of this invention is to provide a switch with means for manually moving the switch blade to the closed-circuit position, thermally responsive means including a resistance for automatically moving the switch blade to the open-circuit position, and a second manually operable means for causing the switch blade to move to the open-circuit position prior to the time the thermally responsive structure operates, said second manually operable means including a part for opening the circuit supplying energy to the resistor as it functions to return the switch blade to the open-circuit position.

A large number of important objects are contemplated by this invention, such additional aims will become apparent during the following specification wherein will be disclosed minor objects of the invention, all of which are embodied in the form of the invention illustrated in the accompanying drawings wherein:

Figure 1 is a face view of an electric switch made to embody the present invention.

Fig. 2 is a front elevational view of the switch with the cover plate removed.

Fig. 3 is a side elevational view of the switch.

Fig. 4 is an elevational view of the opposite side from that shown in Fig. 3, but with the cover plate and knob removed.

Fig. 5 is a longitudinal sectional view through the switch taken on line V—V of Fig. 3.

Fig. 6 is a view similar to Fig. 5, but with the switch blade in the closed-circuit position.

Fig. 7 is a side elevational view similar to that shown in Fig. 3, but with the thermally responsive structure in the operative position.

Fig. 8 is a back elevational view of the switch.

Fig. 9 is a cross sectional view taken on line IX—IX of Fig. 5, and looking in the direction of the arrows.

Fig. 10 is a similar view as that shown in Fig. 9, but with the manually operable means for releasing the switch blade to the open-circuit position in the effective condition.

Figs. 11 and 12 are fragmentary front elevational views of the switch with the face plate removed and showing the detent employed for rendering the thermally responsive structure inoperative in the ineffective and effective conditions respectively.

Fig. 13 is a wiring diagram showing the resistor for operating the thermally responsive structure in shunt circuit; and

Fig. 14 is the wiring diagram showing the thermally responsive resistor in series circuit.

The switch parts made and assembled in accordance with the present invention, have been shown embodied in a conventional wall switch that is normally placed in the well-known outlet box, not here shown, and over which the regulation face plate 16 is disposed.

The frame supporting the hereinafter described parts is generally designated by the numeral 18 and comprises not only the block 20 of insulating material, which is necessary to support the various conductors of current but the metallic parts that are arranged in a manner that will provide adequate and substantial support.

Switch blade 22 is carried by yoke 24 for movement to and from a position where the ends thereof are in engagement with switch points 26

and 28. A stop 30 having shoulders 32 and 34 carries yoke 24 in proximity to branch 36 that is mounted upon shaft 38, journalled in frame 13 and extending forwardly beyond face plate 16 to be operated by knob 40 that is secured to the projected end thereof.

A coil spring 42 has one end thereof secured to branch 36 while the other end bears against yoke 24—thus, yoke 24 and switch blade 22 are moved with a "past center" snap action as shaft 38 is moved about its axis in one direction.

A rocker arm 44 on shaft 38 moves between stops 46 and 48 and receives the force of a return spring 50, which yieldably maintains shaft 38 and knob 40 in one position.

Yoke 24 has an ear 52 thereon to engage beneath either one of shoulders 54 or 56, depending upon the position of the hereinafter described thermally responsive structure. These shoulders 54 and 56 are created upon a shiftable plate 58 mounted upon one end of shaft 60, which is journalled for rotation and rectilinear longitudinal reciprocation in frame 18. A spring 62 yieldably maintains shaft 60 at one end of its path of travel and this plate has an extension 64 formed of insulating material which carries a laterally extending pin 66 that forms a part of a contact point 68.

Plate 58 has laterally extending pins 70 and 72 between which travels arm 74. This arm is mounted upon one end of lower shaft 76 that is journalled in frame 18. The other end of said shaft carries crank 78, which is joined to one end of a strip of thermally responsive metal 80 by link 82. The other end of member 80 is anchored as at 84 to a part of frame 18 and resistor 86 circumscribes strip 80 so that heat may be effectively imparted thereto.

Contact blade 88 normally lies against pin 66 and another contact strip 90 has a free end bearing against contact point 68 while its other end is anchored as at 92 and joined to contact point 26 by conductor 94.

A spring 96 yieldably maintains the free end of arm 74 against pin 72 and therefore, holds contact point 68 against the hump on contact strip 90. This spring 96 assists strip 80 in definitely throwing arm 74 against either pin 70 or 72 since strip 80 changes its form due to heating or cooling a sufficient amount to move arm 74 to a central position between pins 70 and 72.

A second manually operable means which is designed to release the parts so that switch blade 22 may be returned to the open-circuit position by spring 42 and yoke 24, comprises a plunger 98 movably mounted through the medium of stem 99 journalled for longitudinal reciprocation in tube 101. Plunger 98 is against a lever 100 pivotally mounted as at 102 to a part of frame 18.

A bell-crank lever 104 pivotally mounted as at 106 to a portion of frame 18 has one leg 108 thereof underlying the free end of lever 100, while the other leg 110 is movable against plate 58 when plunger 98 is depressed, as seen in Fig. 10.

An L-shaped leaf spring 112 anchored as at 114 to a part of frame 13 has a detent 116 in a portion thereof which underlies lever 100. This spring 112 underlies depending pin 118 on lever 100 so that as lever 100 is moved about its pivotal connection 102, spring 112 is forced rearwardly against release rod 120 journalled for reciprocation in a part of frame 18. While one end of this release rod 120 is engaged by spring 112, the other end thereof engages a strip of insulating material 122 secured to contact blade 88.

Shaft 38 has a radially extending finger 124 movable therewith and this finger normally travels a short distance behind spring 112 to the front of which detent 116 extends. Spring 112 is formed as shown in Figs. 11 and 12 so that upon depressing plunger 98 when finger 124 and its associated parts are in the normal position, spring 112 is moved inwardly beyond finger 124 and a movement of knob and shaft 40 and 38 respectively, will carry finger 124 to the position shown in Fig. 12, where it is caught by detent 116 as soon as plunger 98 is released and before shaft 38 is allowed to return to the normal point of beginning by releasing knob 40.

When the parts are assembled as above described and illustrated, the switch is capable of fulfilling the many objects of this invention. The switch may be mounted in a shunt circuit to automatically move the switch blade to the open-circuit position, as seen in Fig. 3, or may be mounted so that the resistor of the thermally responsive structure is in series circuit. When the switch is in series circuit, the resistor should have capacity enough to carry the load and such rearrangement of contact points as may be necessary to include the resistor in the circuit instead of cutting it out, as in the case in the shunt circuit, may be made to suit conditions.

In describing the operation of the switch it must be assumed that the normal position is that where switch blade 22 is in the open-circuit position and the thermally responsive structure is in the normal cold condition so that arm 74 is in the position shown in Fig. 3. If it is desired to close the circuit and allow the thermally responsive structure to automatically open the circuit, knob 40 is moved in the direction of the arrow in Fig. 1, whereupon flag 126, having indicia 128 thereon and which is carried by yoke 24, will move from the position shown in Fig. 11 to that illustrated in Fig. 12 for the purpose of showing through window 130, the appropriate designation "on."

In so moving knob 40 to the right, or in the direction of the arrow shown in Fig. 1, branch 36 swings about the axis of shaft 38 until spring 42 is moved past center to snap yoke 24 from a position against shoulder 32 on stop 30 (Fig. 5), to a position against shoulder 34 where it is momentarily held until branch 36 is returned to the point of beginning under the influence of return spring 50. This return spring 50 is wound about shaft 38 and urges rocker arm 44 back against stop 48. Plate 58 is moved laterally by ear 52 on yoke 24 until said ear 52 assumes a position beneath shoulder 56. Switch blade 22 on yoke 24 is snapped into engagement with switch points 26 and 28 to close the circuit, for example, to lamp 132. So closing switch blade 22 will supply current to resistor 86 through a circuit traced as follows:

From one supply line through wires 134 and 136, resistor 86, wire 138, contact blade 88, pin and contact point 66 and 68 respectively, blade 90, wire 140, switch point 28, switch blade 22, switch point 26, and thence through wire 142 to complete the circuit.

Resistor 86 will immediately begin to act upon the thermally responsive metal 80 to cause a deformation thereof, for the purpose of drawing link 82 in the direction of the arrow shown in Fig. 4. Shaft 76 will be rotated about its axis thereby to swing arm 74 toward the position shown in Fig. 7. When arm 74 reaches a vertical position, spring 96 will snap the arm to the left

(Figs. 3 and 7), against pin 70, thereby swinging plate 58 about its axis of rotation on shaft 60, which allows yoke 24 to return to the position shown in Fig. 5 under the influence of spring 42.

Obviously, switch blade 22 will leave switch points 26 and 28 to open the circuit.

When switch blade 22 is closed, the circuit supplying current to lamp 132, for example, is as follows:

Wire 134, wire 144 to lamp 132, and thence back to a source of supply through wire 146, switch points 28 and 26, through switch blade 22, and thence to the point of beginning through wire 142.

As plate 58 is moved to release yoke 24, extension 64 thereon will travel therewith and separate contact point 68 and strip 90 which opens the circuit supplying current to resistor 86 for the purpose of allowing the latter to cool and permit metal 80 to return to the normal position. A pictorial illustration of the position of the various parts with contact point 68 and strip 90 parted, is seen in Fig. 7.

If the switch is no longer manipulated, metal 80 will cool and return to the normal position and with it arm 74 will travel to the position shown in Fig. 3. As cooling occurs, the return of arm 74 will strike pin 72 to shift plate 58 back to a position where contact point 68 and strip 90 are again in engagement.

Assuming now that it is desired to again reset the switch so that lamp 132 will burn and that such manual manipulation occurs prior to the time metal 80 returns to the normal position. Knob 40 is again forced to the right and yoke 24 will move in precisely the same way as above set down, however, instead of ear 52 being held against upward movement by shoulder 56, it will be engaged by shoulder 54 on plate 58 until arm 74 strikes pin 72; thereby releasing said ear and permitting spring 42 to snap switch 22 open. This interval of time depends entirely upon the condition of metal 80 when the switch was manually moved to the "on" position after it had been automatically opened by the heating of metal 80. When arm 74 again moves to the normal position shown in Fig. 3, a portion of the circuit supplying energy to resistor 86, comprising contact point 68 and contact strip 90 will be closed by the bringing together of said contact point 68 and said contact strip 90 thereby readying said portion of the circuit for the part of the cycle of operation requiring the heating of bi-metallic strip 80.

Assuming now that the switch is in the normal position with contact blade 22 bridging switch points 26 and 28 and that metal 80 has been distorted slightly, yet not enough to automatically trip the thermally responsive structure. The user may manually release switch blade 22 by depressing plunger 98. Such manipulation of this plunger acts upon lever 100 to move it inwardly about 102 to force bell-crank lever 104 about the axis of pin 106. Leg 110 will be moved against plate 58 and spring 62 compressed as seen in Fig. 10. Such action takes place when shaft 60 moves longitudinally in its bearings. Plate 58 will immediately release yoke 24 and spring 42 will serve to snap the associated parts of the switch back to the open-circuit position.

When plunger 98 is depressed as just mentioned, release rod 120 is moved against contact blade 88 to force it away from pin 66, thus the circuit to resistor 86 is opened before switch blade 22 is snapped to the open-circuit position. Spring 112 lying behind pin 118 is moved inwardly against one end of release rod 120, which slides longitudinally against contact blade 88 to effect such circuit opening. Thus, the ability of being able to operate the switch to the open-circuit position is always available upon depressing plunger 98.

It is to be remembered throughout the foregoing description, that flag 126 will always move with yoke 24 and place the appropriate word, i. e. "on" or "off" behind window 130 in plate 16.

The switch parts may be set so that the thermally responsive structure will not move the parts to the open-circuit position. In so setting the switch so that the lamp 132, for example, will burn constantly, plunger 98 is first depressed so as to move spring 112 rearwardly past finger 124 mounted directly upon shaft 38.

When the switch parts are in the normal position, finger 124 is positioned with respect to the reduced end of spring 112, as seen in Fig. 2. Spring 112 is easily forced rearwardly by lever 100 and pin 118 thereon after which knob 40 is moved in the direction of the arrow in Fig. 1, to dispose finger 124 in the position behind detent 116 (Fig. 12). So depressing plunger 98 will move release rod 120 rearwardly against contact blade 88 so as to separate said blade from pin 66 and thereby open the shunt circuit to resistor 86. In such condition, switch blade 22 bridges contact points 26 and 28 to cause lamp 132 to burn.

Knob 40 is held in the set position to which it has been moved by detent 116, finger 124 and shaft 38. When knob 40 is so held, signal plate 148 on shaft 38 has the portion 150, for example, disposed behind window 152 in plate 16 so as to indicate to the user that the switch is set to permanently maintain the parts thereof in the closed circuit position. Obviously, the thermally responsive structure will not automatically open the switch and to again move switch blade 22 to the open-circuit position, plunger 98 is depressed to move detent 116 out of engagement with finger 124.

Bell-crank lever 104 will simultaneously be moved to trip yoke 24 as above made clear, and when spring 112 is permitted to again assume its normal position, release rod 120 will permit contact blade 88 to return to a place where the shunt circuit to resistor 86 is closed.

Throughout all of the aforesaid steps of operation, flag 126 will move to signal the condition of the switch parts, as regards the "open" or "closed" circuit positions.

When the parts of the switch are made as above described and illustrated in the accompanying drawings, the same may be placed in a conventional outlet box or used in any suitable housing or any location where a circuit is to be automatically or manually controlled as permitted through the employment of the parts above set down.

Resistor 86 has heretofore been indicated as being in a shunt circuit, but it is within the concepts of the invention to place a similar resistor 200 in a series circuit in the manner illustrated diagrammatically in Fig. 14.

Lamp 202 is controlled by switch blade 204 which bridges switch points 206 and 208. When resistor 200 is in series circuit with lamp 202, with switch blade 204 bridging switch points 206 and 208, contact points 210 and 212 remain apart until resistor 200 distorts under heat to auto-

matically bring together these said points. These points 210 and 212 are analogous to members 90 and 68 respectively, as shown in Figs. 3 and 7. The only change necessary to convert the switch illustrated, to a series circuit being the placement of contact 68 on the upper inclined face of extension 64.

If switch blade 204 is manually returned to the closed-circuit condition again before the metal in resistor returns to the normal position, closed points 210 and 212 with bridged points 206 and 208, will allow lamp 202 to burn as current is passing through the following circuit without resistor being therein:

Wires 214, 216 and 218, points 210 and 212, wires 220 and 222, switch blade 204, wire 224, lamp 202, and wire 226.

When the resistor cools and its metal returns to normal, switch points 210 and 212 will be again opened through the same mechanical action as disclosed for the control of points 68 and 90.

When the switch is set for causing lamp 202 to burn until manually cut off, points 228 and 230 are locked together by detent 116 as switch blade 204 is moved to the closed-circuit position. Lamp 202 is then caused to burn until the parts are released by another manipulation of the mechanism. Under these conditions, the circuit supplying lamp 202 does not include resistor 200 and is traced as follows:

Wire 214, wire 232, conductor 228, point 230, wire 234, point 208, blade 204, point 206, wire 224, lamp 202, and wire 226.

Conductor 228 in this circuit is the same as contact blade 88 heretofore described, and point 230 is the same as pin 66. The only rearrangement necessary is to place pin 66 on the other side of blade 88 so that the two normally remain apart and so that movement of rod 120 will close these conductors as the switch blade is locked in the closed-circuit position.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. In an electric switch of the character described, a switch blade movable to open and closed circuit positions; means for moving said switch blade with a snap action to either of said positions; manually operable parts for actuating the means for moving the switch blade to place the same in the closed position; a latch to releasably hold the switch blade in the last mentioned position; thermally responsive structure, including a resistor, for automatically releasing the latch to cause the switch blade to move to the open circuit position after the same has remained in the closed circuit position a period of time; a second manually operable means for releasing the latch prior to its release automatically by the said thermally responsive structure; a shunt circuit having the resistor and a switch therein between said second manually operable means and the shunt circuit switch whereby to open the shunt circuit as the latch is released to cause the switch blade to assume the open circuit position.

2. In an electric switch of the character described, a switch blade movable to open and closed circuit positions; means for moving said switch blade with a snap action to either of said positions; manually operable parts for actuating the means for moving the switch blade to place the same in the closed circuit position; a latch to releasably hold the switch blade in the last mentioned position; thermally responsive structure for automatically releasing the latch to cause the switch blade to move to the open circuit position after the same has remained in the closed circuit position a period of time; and a second manually operable means for releasing the latch prior to its release automatically by the said thermally responsive structure, said latch being formed to hold the means for moving the switch blade in place to maintain the switch blade in the closed circuit position, upon manipulation of the first mentioned manually operable parts, after the thermally responsive structure has once automatically released the latch and before the same has returned to normal condition by cooling.

3. In an electric switch of the character described, a switch blade movable to open and closed circuit positions; means for moving said switch blade with a snap action to either of said positions; manually operable parts for actuating the means for moving the switch blade to place the same in the closed position; a latch to releasably hold the switch blade in the last mentioned position; thermally responsive structure including a resistor for automatically releasing the latch to cause the switch blade to move to the open circuit position after the same has remained in the closed circuit position a period of time; a second manually operable means for releasing the latch prior to its release automatically by the said thermally responsive structure; a shunt circuit having the resistor and a switch therein between said second manually operable means and the shunt circuit switch whereby to open the shunt circuit as the latch is released to cause the switch blade to assume the open circuit position, said latch having a switch contact point attached thereto and movable therewith to open and close the shunt circuit as the latch is moved.

4. In an electric switch of the character described, a switch blade movable to open and closed circuit positions; means for moving said switch blade with a snap action to either of said positions; manually operable parts for actuating the means for moving the switch blade to place the same in the closed position; a latch to releasably hold the switch blade in the last mentioned position; thermally responsive structure including a resistor for automatically releasing the latch to cause the switch blade to move to the open circuit position after the same has remained in the closed circuit position a period of time; a second manually operable means for releasing the latch prior to its release automatically by the said thermally responsive structure; a shunt circuit having the resistor and a switch therein between said second manually operable means and the shunt circuit switch whereby to open the shunt circuit as the latch is released, to cause the switch blade to assume the open circuit position, said latch having a switch contact point attached thereto and movable therewith to open and close the shunt circuit as the latch is moved, said switch contact point being in a position to open the shunt circuit when the thermally responsive structure has moved the latch to cause the switch blade to move to the open circuit position.

5. In an electric switch of the character described, a switch blade movable to open and closed circuit positions; means for moving said switch blade with a snap action to either of said positions; manually operable parts for actuating the means for moving the switch blade to place

the same in the closed position; a latch to releasably hold the switch blade in the last mentioned position; thermally responsive structure including a resistor for automatically releasing the latch to cause the switch blade to move to the open circuit position after the same has remained in the closed circuit position for a period of time; a second manually operable means for releasing the latch prior to its release automatically by the said thermally responsive structure; a shunt circuit having the resistor and a switch therein between said second manually operable means and the shunt circuit switch whereby to open the shunt circuit as the latch is released to cause the switch blade to assume the open circuit position, said latch having a switch contact point attached thereto and movable therewith to open and close the shunt circuit as the latch is moved, said switch contact point being in a position to close the shunt circuit when the thermally responsive structure is in the normal position.

6. In an electric switch of the character described, a switch blade movable to open and closed-circuit positions; means for moving said switch blade with a snap action to either of said positions; manually operable parts for actuating the means for moving the switch blade to place the same in the closed-circuit position; a latch to releasably hold the switch blade in the last mentioned position; thermally responsive structure including a resistor for automatically releasing the latch to cause the switch blade to move to the open-circuit position after the same has remained in the closed-circuit position a period of time; a second manually operable means for releasing the latch prior to its release automatically by the said thermally responsive structure; a shunt circuit having the resistor and a switch therein across the switch blade; a switch in the circuit being controlled by the said blade; and a connector between said second manually operable means and the last mentioned switch whereby to open the circuit as the latch is released to cause the blade to assume the open-circuit position.

7. In an electric switch of the character described, a switch blade movable to open and closed-circuit positions; means for moving said switch blade with a snap action to either of said positions; manually operable parts for actuating the means for moving the switch blade to place the same in the closed-circuit position; a latch to releasably hold the switch blade in the last mentioned position; thermally responsive structure for automatically releasing the latch to cause the switch blade to move to the open-circuit position after the same has remained in the closed circuit position a period of time; a second manually operable means for releasing the latch prior to its release automatically by the said thermally responsive structure; a detent independent of the said latch for retaining the switch blade in the closed-circuit position; and elements independent of the thermally responsive structure for releasing the detent at will to cause the switch blade to move to the open-circuit position.

8. In an electric switch of the character described, a switch blade movable to open and closed-circuit positions; means for moving said switch blade with a snap action to either of said positions; manually operable parts for actuating the means for moving the switch blade to place the same in the closed-circuit position; a latch to releasably hold the switch blade in the last mentioned position; thermally responsive structure for automatically releasing the latch to cause the switch blade to move to the open-circuit position after the same has remained in the closed circuit position a period of time; a second manually operable means for releasing the latch pior to its release automatically by the said thermally responsive structure; a detent independent of the said latch for retaining the switch blade in the closed-circuit position; and elements independent of the thermally responsive structure for releasing the detent at will to cause the switch blade to move to the open-circuit position, said elements being disposed for release by the second manually operable means when serving to retain the switch blade in the closed-circuit position.

9. In an electric switch of the character described, a switch blade movable to open and closed-circuit positions; means for moving said switch blade with a snap action to either of said positions; manually operable parts for actuating the means for moving the switch blade to place the same in the closed-circuit position; a latch to releasably hold the switch blade in the last mentioned position; thermally-responsive structure including a resistor for automatically releasing the latch to cause the switch blade to move to the open-circuit position after the same has remained in the closed-circuit position a period of time; a second manually operable means for releasing the latch prior to its release automatically by the said thermally-responsive structure; a shunt circuit having the resistor and a switch therein across the switch blade; a detent independent of the said latch for retaining the switch blade in the closed-circuit position; elements independent of the thermally responsive structure for releasing the detent at will to cause the switch blade to move to the open-circuit position; and a connector between the detent and the shunt circuit switch to hold the latter open when the detent is in the operative position.

10. In an electric switch of the character described, a switch blade movable to open and closed-circuit positions; means for moving said switch blade with a snap action to either of said positions; manually operable parts for actuating the means for moving the switch blade to place the same in the closed-circuit position; a latch to releasably hold the switch blade in the last mentioned position; thermally responsive structure including a resistor for automatically releasing the latch to cause the switch blade to move to the open-circuit position after the same has remained in the closed-circuit position a period of time; a second manually operable means for releasing the latch prior to its release automatically by the said thermally responsive structure; a shunt circuit having the resistor and a switch therein across the switch blade; a detent independent of the said latch for retaining the switch blade in the closed-circuit position; elements independent of the thermally responsive structure for releasing the detent at will to cause the switch blade to move to the open-circuit position; and a connector between the detent and the shunt circuit switch to hold the latter open when the detent is in the operative position, said elements being disposed for release by the second manually operable means when the detent is in the operative position.

11. In an electric switch of the character described, a switch blade movable to open and

closed-circuit positions; means for moving said switch blade with a snap action to either of said positions; manually operable parts for actuating the means for moving the switch blade to place the same in the closed-circuit position; a latch to releasably hold the switch blade in the last mentioned position; thermally responsive structure including a resistor for automatically releasing the latch to cause the switch blade to move to the open-circuit position after the same has remained in the closed-circuit position a period of time; a second manually operable means for releasing the latch prior to its release automatically by the said thermally responsive structure; a detent independent of the latch for retaining the switch blade in the closed-circuit position; and cooperating means on both the manually operable parts and said second manually operable means respectively for positioning the detent to hold the switch blade in the closed-circuit position.

12. In an electric switch of the character described, a switch blade movable to open and closed-circuit positions; means for moving said switch blade with a snap action to either of said positions; manually operable parts for actuating the means for moving the switch blade to place the same in the closed-circuit position; a latch to releasably hold the switch blade in the last mentioned position; thermally responsive structure including a resistor for automatically releasing the latch to cause the switch blade to move to the open-circuit position after the same has remained in the closed-circuit position a period of time; a second manually operable means for releasing the latch prior to its release automatically by the said thermally responsive structure; a detent independent of the latch for retaining the switch blade in the closed-circuit position; and cooperating means on both the manually operable parts and said second manually operable means respectively for positioning the detent to hold the switch blade in the closed-circuit position, the said cooperating means being arranged to so position the detent when the second manually operable means is actuated and manually held in place until the first mentioned manually operable parts move the switch blade to the closed-circuit position.

13. In an electric switch of the character described, a switch blade movable to open and closed-circuit positions; means for moving said switch blade with a snap action to either of said positions; manually operable parts for actuating the means for moving the switch blade to place the same in the closed-circuit position; a latch to releasably hold the switch blade in the last mentioned position; thermally responsive structure including a resistor for automatically releasing the latch to cause the switch blade to move to the open-circuit position after the same has remained in the closed-circuit position a period of time; a second manually operable means for releasing the latch prior to its release automatically by the said thermally responsive structure; a detent independent of the latch for retaining the switch blade in the closed-circuit position; and cooperating means on both the manually operable parts and said second manually operable means respectively for positioning the detent to hold the switch blade in the closed-circuit position, the said cooperating means being arranged to so position the detent when the second manually operable means is actuated and manually held in place until the first mentioned manually operable parts move the switch blade to the closed-circuit position, said detent being releasable by the said second manually operable means after the detent has served to retain the switch blade in the closed-circuit position.

14. In an electric switch of the character described, a switch blade movable to open and closed-circuit positions; means for moving said switch blade with a snap action to either of said positions; manually operable parts for actuating the means for moving the switch blade to place the same in the closed-circuit position; a latch to releasably hold the switch blade in the last mentioned position; thermally responsive structure including a resistor for automatically releasing the latch to cause the switch blade to move to the open-circuit position after the same has remained in the closed-circuit position a period of time; a second manually operable means for releasing the latch prior to its release automatically by the said thermally responsive structure; a detent independent of the latch for retaining the switch blade in the closed-circuit position; and cooperating means on both the manually operable parts and said second manually operable means respectively for positioning the detent to hold the switch blade in the closed-circuit position, said detent serving to so hold the latch inoperative whereby to render ineffective the thermally responsive structure.

15. In an electric switch of the character described, a switch blade movable to open and closed-circuit positions; means for moving said switch blade with a snap action to either of said positions; manually operable parts for actuating the means for moving the switch blade to place the same in the closed-circuit position; a latch to releasably hold the switch blade in the last mentioned position; thermally responsive structure including a resistor for automatically releasing the latch to cause the switch blade to move to the open-circuit position after the same has remained in the closed circuit position a period of time; and a second manually operable means for releasing the latch prior to its release automatically by said thermally responsive structure, said latch comprising a pivotally mounted plate, provided with a pair of shoulders, movable about its axis by the thermally responsive structure, a part on the means for moving the switch blade with a snap action engageable by one of the shoulders to hold the switch blade in the closed-circuit position, and a lever operable by the second manually operable means for moving the plate longitudinally along the axis of rotation to disengage either of the shoulders from said part.

16. In an electric switch of the character described, a switch blade movable to open and closed-circuit positions; means for moving said switch blade with a snap action to either of said positions; manually operable parts for actuating the means for moving the switch blade to place the same in the closed-circuit position; a latch to releasably hold the switch blade in the last mentioned position; thermally responsive structure including a resistor for automatically releasing the latch to cause the switch blade to move to the open-circuit position after the same has remained in the closed circuit position a period of time; and a second manually operable means for releasing the latch prior to its release automatically by said thermally responsive structure, said latch comprising a pivotally mounted plate, provided with a pair of shoulders, movable

about its axis by the thermally responsive structure, a part on the means for moving the switch blade with a snap action engageable by one of the shoulders to hold the switch blade in the closed-circuit position; and a lever operable by the second manually operable means for moving the plate longitudinally along the axis of rotation to disengage either of the shoulders from said part, said resistor being in a circuit having a switch movable to the open and closed-positions by the plate as the latter swings about its axis of rotation.

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